

# *DIVISION 16*

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## ELECTRICAL

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## SECTION 16010

### ELECTRICAL GENERAL PROVISIONS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

A. The general provisions of the contract, including general and special conditions and general requirements, apply to the work specified in DIVISION 16 - ELECTRICAL.

B. Separation of Division 16 into Sections is for convenience only and is not intended to establish limits of work. Sections are as follows:

16010 ELECTRICAL GENERAL PROVISIONS

16100 ELECTRICAL BASIC MATERIALS AND METHODS

16400 ELECTRICAL SERVICE AND DISTRIBUTION SYSTEMS

16500 ELECTRICAL LIGHTING

16600 ELECTRICAL SPECIAL SYSTEMS

##### 1.2 SCOPE

A. The work under this Section includes furnishing and installing wires, conductors, cables, conduit and conduit fittings, wiring devices, junction and outlet boxes, panelboards, circuit breakers, fuses, relays, safety switches, lighting fixtures, lamps, cabinets, grounding connections, emergency lighting system, automatic transfer switches, raceways for telephone outlets, raceways for computer outlets, fire alarm system, paging system, nurse call and code blue systems, raceways for CATV outlets, raceways for cameras (TV and infrared), intercom system, transformers, and other equipment specified or necessary for a complete installation. The work also includes making building modifications if necessary to get these items to the locations for installation.

B. Also included in the work is the power wiring for other items indicated on the architectural plans, as well as power wiring for the equipment specified in DIVISION 15 - MECHANICAL.

C. Roughing-in only, to the extent indicated on the drawings, shall be provided for other equipment.

D. Removal of existing electrical equipment not being reused.

##### 1.3 CUTTING AND PATCHING

A. Contractor shall do his work in such a way to avoid cutting where possible. Holes cut shall be patched in a suitable manner and shall be refinished to match the existing finish. Holes cut in exterior

walls shall be patched, flashed, and completely waterproofed. Contractor shall patch and/or repair walls, ceilings, and floors where existing equipment is removed.

B. Cutting and patching for the work of this Division shall be in accordance with the requirements of the General Conditions. Openings around conduit penetrations shall be sealed.

C. Work of this Division shall include providing information for any required openings to those responsible for concrete slabs and other concrete members.

D. Field cut openings in concrete shall be located to avoid the reinforcing. Locations shall be subject to approval of the Architect.

E. No structural members shall be field cut or pierced without the approval of the Architect.

F. Inserts in slabs and beams for fastening work shall be drilled type.

G. For post-tensioned slabs and beams, inserts for fastening work shall be cast in place wherever possible. If additional inserts are required after concrete is placed, drilled type shall be used. Drilling shall not penetrate the post-tensioning tendons. Powder driver fasteners shall not be used.

H. Grouting shall be provided around raceway penetrations through concrete floors equal to the fire rating of the floor (this shall also inhibit water from leaking through the floor).

#### 1.4 DRAWINGS

A. Outlets shown on electrical drawings are located approximately only. Refer to architectural drawings for necessary dimensions. Refer to architectural, structural, and mechanical drawings as well as equipment manufacturer's shop drawings and rough-in drawings, and adjust work accordingly to provide a coordinated installation. Contractor shall install fire alarm devices as near as possible to the locations indicated on the drawings but shall move them as necessary to avoid conflicts with existing equipment and to be located sufficiently away from hot objects.

B. Smoke detectors and heat detectors shall be located so that the maximum distance between detectors is 30'-0", and the maximum distance from walls is 15'-0". Locations shall conform to other restrictions of NFPA 72 to include the requirement that smoke detectors be kept at least 36" away from HVAC grilles. Contractor shall plan for contingencies in connection therewith to include providing additional smoke detectors and heat detectors.

C. Visual signal unit and audiovisual signal unit locations shall be adjusted as necessary to avoid conflicts with other equipment. Contractor shall plan for contingencies in connection therewith to providing additional signal units.

D. Visual signal unit and audiovisual signal unit locations shall be adjusted as may be necessary to meet NFPA 72 paragraphs 4-4.4.1 and 4-4.4.2.

#### 1.5 LAWS AND PERMITS

A. The National Electrical Code (2005) and State, Parish, City and local building codes shall be considered a part of these specifications, and pertinent articles will not be repeated herein. These codes

shall establish the minimum acceptable criteria where more stringent requirements have not been defined in these specifications and/or drawings.

- B. The Contractor shall apply for permits and pay inspection fees incidental to electrical work.
- C. No work shall be concealed until approved by the local inspector and local regulations shall be adhered to.
- D. Upon completion, a certificate of approval from the appropriate regulatory agency shall be furnished to the Architect.

#### 1.6 VISITING SITE

The bidder shall visit the site of proposed work so that he may understand the facilities, difficulties, and restrictions attending the execution of the contract. He will be allowed no additional compensation for failure to be so informed.

#### 1.7 INTERRUPTION OF SERVICES

Services in existing building are to be kept in operation at all times, except when specific permission is given to do otherwise. Before any services are interrupted, arrangements shall be made with the occupants to do this work at a time most convenient to them. This procedure may involve working at night, on Saturday or Sunday, or at a special time of the year, with the length of time of the interruption agreed upon in advance. Once any service is interrupted, work to restore the service in the shortest possible time shall be on a continuous basis unless temporary service is provided or approval is obtained from the Owner to do otherwise. Any temporary services required shall be work of this Division. Allowance shall be made in the Contractor's bid for the cost of any overtime work in this connection.

#### 1.8 GUARANTEE

The Contractor shall guarantee materials and workmanship for one year after final acceptance of entire project unless a longer guarantee is indicated hereinafter for specific equipment.

### PART 2 - PRODUCTS

#### 2.1 MATERIAL AND WORKMANSHIP

Equipment and materials shall be new and shall be listed by Underwriters Laboratories, Inc. in categories for which standards have been set by that agency. Whenever two or more of the same product are indicated, they shall be of the same manufacturer. In particular, panelboards shall be of the same manufacturer. Methods of installation shall be in full accord with the latest and best electrical and mechanical engineering practices.

#### 2.2 SUBSTITUTIONS

A. Names of manufacturers or catalog numbers are mentioned herein in order to establish a standard as to design and quality. Other products similar in design and of equal quality may be used if

submitted to the Architect and found acceptable by him. Refer to General Conditions for additional information.

B. When the Contractor elects to use an acceptable alternate manufacturer's equipment, the Contractor shall be responsible to coordinate the change with the trades affected. The Contractor shall also pay for any additional work required under this Division as well as any other Division if the alternate equipment is used.

C. Lighting fixture substitutions shall also be similar in appearance, construction and photometrics (photometric information shall be based on independent laboratory reports) to specified lighting fixtures.

D. If required by Architect because of substitutions, the Contractor shall submit for approval 1/4" scale working drawings of equipment areas with both plan and Section views.

### 2.3 SUBMITTALS

A. Within 30 days after award of contract, the Contractor shall submit for review six copies of descriptive literature or shop drawings for the following material which he proposes to use:

Lamps.	Circuit breakers.
Wiring devices and plates.	Intercom system.
Panelboards.	Fire alarm system.
Fuses.	Paging system.
Safety switches.	Nurse call system.
Lighting fixtures.	Code blue system.
Automatic transfer switches.	Cable television system.
	Transformers.

B. In addition, the name of the manufacturer of conduit, E.M.T., and conductors to be used shall be submitted for review.

C. Where applicable, submissions shall include installation drawings and brochures showing locations, methods of anchoring, connections to work of others, wall or ceiling conditions at each particular installation and special floor mounting conditions.

D. Submissions shall be identified with project name, equipment name and number (if assigned a number) same as the name and number indicated on the drawings; shall be properly marked to show model numbers and any accessories being furnished; and shall have the Contractor's stamp showing he has reviewed the submittal and found it to be in accordance with the specifications and drawings. Items of Division 16 to be submitted shall be submitted in one package.

E. Submittals which do not comply with the above will be returned without review, for resubmittal.

### PART 3 - EXECUTION

#### 3.1 RECORD DRAWINGS

At the completion of the work, unless noted otherwise in the General Conditions, mark-up a mylar reproducible and two sets of blueprints in a neat and understandable manner to show significant changes made during construction. Wiring and raceways installed shall be indicated (routings, wire size and quantity) on the record drawings even if not indicated on the contract drawings. Final payment will be withheld until these drawings are furnished to the Architect. The Contractor shall pay for the reproduction costs.

#### 3.2 OPERATING INSTRUCTIONS

A. Before final acceptance, prepare and deliver to the Architect two bound copies of operating instructions, which shall include:

1. Description of major components of power systems and each special system, including the function of major items.
2. Detailed operating instructions and instructions for making routine minor adjustments.
3. Routine maintenance operations.
4. Manufacturer's catalog data and service instructions and parts list for each piece of operating equipment.
5. Final reviewed submittals.

B. Instruct Owner in the care and operation of equipment and shall provide the services of a competent mechanic for this purpose.

C. Literature shall be substantially bound in a suitable number of volumes so as to permit heavy usage and shall include wiring diagrams, fabrication drawings and other information as may be required.

#### 3.3 MECHANICAL EQUIPMENT

A. Electrical work in connection with DIVISION 15 - MECHANICAL required but not indicated as work of DIVISION 16 - ELECTRICAL shall be work of DIVISION 15 - MECHANICAL. Except as may be hereinafter indicated, control wiring will be done as work of DIVISION 15 - MECHANICAL.

B. Work of other Divisions will include furnishing and setting motors, except that V-belt drive motors shall be set as work of this Division.

C. Unless indicated otherwise, magnetic starters (including variable speed drives) will be furnished under other Divisions for installation under this Division.

D. Overload elements in starters shall be selected according to actual motor nameplate full load current. Responsibility for this coordination shall lie with the Division under which the particular starter is furnished.

E. Unless indicated otherwise, power disconnect switches and single speed manual starting switches shall be furnished and installed under this Division. Where combination magnetic starters are provided as work of another Division, the associated disconnect switch will be furnished as work of that Division. Disconnect switches for control wiring will be furnished and installed under DIVISION 15 - MECHANICAL.

F. Where Division 15 schedules indicate that equipment is furnished with a disconnect, the disconnect shall be installed and connected as work of Division 16.

G. Firestats for single phase fans will be furnished and set under DIVISION 15 - MECHANICAL, and electrically connected in the branch circuit wiring as work of this Division. Any other control wiring, including temperature control wiring, high voltage interlocking, start-stop wiring, together with conduit for same, will be furnished and installed under DIVISION 15 - MECHANICAL; this includes, but is not limited to, thermostats, damper motors, aquastats, firestats, push buttons, selector switches, control power transformers, control panel, etc.

H. Refer to DIVISION 15 - MECHANICAL, and to mechanical drawings for any additional electrical power work required.

#### 3.4 WORK RELATED TO EQUIPMENT NOT FURNISHED AS WORK OF THIS DIVISION

Unless specifically indicated otherwise, any required electrical services for and required electrical connections to items shown on the architectural drawings or specified to be furnished in other Divisions of specification or by Owner shall be electrically connected as work of this Division.

#### 3.5 PAINTING

Painting, including painting of exposed conduit is specified under DIVISION 9 - FINISHES. Damaged surfaces of factory-finished items, however, shall be repaired to the satisfaction of the Architect as the work of this Division.

#### 3.6 PROTECTION OF WORK

Protect the equipment, fixtures, and work from damage. Damaged work will be rejected and replaced at the expense of the Contractor. Lighting fixtures, panels and similar equipment shall likewise be protected from damage and from the weather. Provide adequate and proper storage facilities for such items during the progress of the work.

#### 3.7 BUILDING CODE RESTRICTIONS

Contractor shall assure that he does not install electrical equipment including raceways in or through areas restricted by the building codes. These areas include elevator shafts and stairs.

### 3.8 EXISTING WORK

- A. Remove existing lighting fixtures from areas affected by new construction and from areas to be relighted. After completion of work in a given area, the Contractor shall reinstall the existing lighting fixtures or install new lighting fixtures as indicated.
- B. Where existing ceilings are being removed, provide new supports for any raceways, outlets, junction boxes, or any other electrical items which are to remain and which depend upon the existing ceiling suspension system for support. The new supports shall be attached to the structure/slab above.
- C. Existing outlets not to be reused shall be removed unless directed otherwise. Where outlets are indicated to remain as junction boxes, wall outlets shall be provided with blank device plates of the type hereinafter specified and ceiling outlets shall be provided with Yorkville #76 covers where fixture studs exist and #176 where there are no studs.
- D. Where new wall or ceiling finishes are applied, existing equipment and cover plates for wiring devices, junction boxes, telephone outlets and data outlets, etc., shall be removed and reinstalled. Provide extension rings on outlets to remain, where necessary. New cover plates shall also be installed on boxes that do not contain cover plates. Existing outlets, boxes, etc., are not shown on the drawings; bidder shall visit the site to locate these.
- E. Existing exposed conduit or other electrical equipment not to be reused shall be removed. Existing conduit not to be reused and located in accessible attic spaces also shall be removed.
- F. Existing conduits in good condition (and of the type and size required) may be reused. Existing conductors, wall switches and receptacles which are required to be removed, unless otherwise individually indicated, shall not be reused.
- G. Electrical equipment removed and not to be reused shall be stored in one location on the site; any equipment and material which the Owner does not wish to retain shall become the property of the Contractor and shall be removed from the site by him.
- H. Where apparent routings of existing raceways are indicated, it is not possible to guarantee that these routings are correct. The Contractor shall allow for contingencies.
- I. Where existing raceways are indicated to be reused, it is not possible to guarantee that the existing raceways are in suitable condition to be reused. Before conductors are installed in existing raceways, the raceways shall be cleaned out and a try-plug  $\frac{1}{4}$ " smaller than the inside diameter of the raceway pulled through to assure continuity. Raceways which are found to be broken, blocked, and/or defective in any way shall have the defective sections replaced or entirely new raceway provided with routing subject to approval of the Architect. The Contractor shall allow for contingencies in connection therewith.
- J. Where outlets to remain are fed from outlets in partitions to be removed, or ceilings and walls to which new finishes are to be applied, the Contractor shall provide such new homeruns or other rerouting as may be required by job conditions to insure service to the outlets to remain.
- K. Where existing equipment including wiring and raceways is in conflict with work of this project, Contractor shall rework/reroute/relocate this equipment as necessary.

L. Remove existing electrical equipment (including but not limited to fire alarm panels, communication panels, etc.) that might be damaged during construction unless the Owner prefers that this equipment be kept in operation during construction. Reinstall, test and put equipment back in proper working order unless indicated otherwise. The Contractor should (for his protection) test the equipment prior to removal to insure that the equipment operates properly; the Owner should be notified in writing of any existing malfunctions.

M. Since a portion of the existing building will be occupied during construction, Contractor shall provide temporary fire alarm protection in the renovated areas during construction. Maintain system during construction.

**END OF SECTION**

SECTION 16100

ELECTRICAL BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SCOPE

Work described in this Section includes providing labor, materials and equipment indicated, specified and necessary for a complete and operating electrical system and related systems in accordance with SECTION 16010 - ELECTRICAL GENERAL PROVISIONS.

PART 2 - PRODUCTS

2.1 CONDUIT AND TUBING

A. Rigid steel conduit and electrical metallic tubing shall be manufactured by Allied, Triangle-PWC, Republic, Wheatland, or approved equal. Conduit shall be threaded heavy wall hot-dipped galvanized (inside and out) steel conduit. Electrical metallic tubing shall have galvanized exterior and galvanized or equivalent plastic coated interior to protect against corrosion.

B. Rigid aluminum conduit shall be manufactured by New Jersey Aluminum, or VAW of America from 6063-T42 extruded Schedule 40 pipe. The interior surface shall be coated with special approved lubricating liner.

2.2 CONDUCTORS

A. Conductors shall be copper.

B. Branch circuit wiring shall be #12 AWG or larger (as required for the particular equipment to be fed) with flame resistant insulation. Conductors #8 AWG and larger shall be stranded. Insulation on branch circuit conductors shall be type THHN/THWN, unless indicated otherwise or otherwise required by the particular application.

C. Feeds to surface and/or suspended fluorescent fixtures shall be #12 AWG type THHN/THWN. Wiring through channels of continuous rows shall be #12 AWG and type THHN/THWN, or XHHW. Recessed fluorescent fixtures shall be fed with #12 AWG type THHN/THWN or type XHHW conductors.

D. Surface mounted high intensity discharge (HID) lighting fixtures shall be fed with #12 AWG type THHN/THWN unless higher temperature rated conductors are required for the particular fixtures provided. Recessed HID fixtures shall be fed with type SF-2, SFF-2, PF, or PFF unless complete with prewired outlet box approved for type THHN/THWN conductors. Lighting standards shall be wired with type THHN/THWN from wiring handhole in standard to fixtures unless higher temperature conductors are required for the particular fixtures provided.

